

# The South African aquatic genus *Cadiscus* (Compositae-Senecioneae) sunk in *Senecio*

BERTIL NORDENSTAM<sup>1</sup>, PIETER B. PELSER<sup>2</sup> & LINDA E. WATSON<sup>2</sup>

<sup>1</sup>Department of Phanerogamic Botany  
Swedish Museum of Natural History  
Box 50007, S-104 05 Stockholm, Sweden  
bertil.nordenstam@nrm.se

<sup>2</sup>Oklahoma State University, Botany Department  
104 Life Sciences East, Stillwater  
Oklahoma 74078-3013, USA  
pieter.pelsler@okstate.edu  
linda.watson10@okstate.edu

## Abstract

The South African monotypic genus *Cadiscus* E.MEY. ex DC. (Asteraceae–Senecioneae) is an aquatic herb with some morphological features that are unusual in the tribe (white ray-florets and coarse, awn-like pappus bristles) and others that are reminiscent of species of subtribe Othonninae (ecalyculate capitula, relatively few, broad and connate involucre bracts, and sterile disc-floret styles). Unexpectedly, however, both plastid and nuclear phylogenies provided strong evidence that the genus is deeply nested in *Senecio* s.str. of subtribe Senecioninae. The unusual morphology is explained as adaptations to an aquatic habitat, and the genus is sunk in *Senecio* as *Senecio cadiscus* B.NORD. & PELSER, nom. nov.

## Introduction

*Cadiscus* E.MEY. ex DC. is a monotypic genus of the tribe Senecioneae erected for *Cadiscus aquaticus* E.MEY. ex DC., a rare and endangered aquatic herb confined to a few seasonal ponds or vernal pools in the Western Cape Province of South Africa. DE CANDOLLE (1838) placed it among Compositae incertae sedis, and later authors (e.g., BENTHAM 1873a, 1873b, HARVEY 1865, HEMSLEY 1887) treated the genus in the Helenieae on the basis of its coarse and rigid pappus (ORNDUFF et al. 1967). In 1967, ORNDUFF et al. noticed morphological similarities between *Cadiscus* and *Othonna* and allied genera and referred the genus to the Senecioneae, which was followed by later authors (e.g., NORDENSTAM 1968, 1977, 2007, BREMER 1994).

More specifically, ORNDUFF et al. (1967) sought its affinities among members of subtribe Othonninae with which *Cadiscus* shares an ecalyculate involucre composed of relatively broad phyllaries that are connate in their basal half, a chromosome number of  $n = 10$ , sterile disc floret styles, and white ray florets. These features are, however, not present in all Othonninae species. In addition, the styles of *Cadiscus* are quite different from those of *Othonna*. The *Cadiscus* style is distinctly branched, has a truncate tuft of sweeping-hairs, and even shows traces of a divided stigmatic surface on the inside of the branches, whereas the *Othonna* style is simple, apically obtuse or conical with a collar of very short sweeping-hairs or papillae, and no stigmatic surface. In addition, taxa with white rays do occur in different genera within Senecioneae (e.g., *Dolichoglottis*, *Urostemon*, *Dauresia*, *Stenops*, *Senecio* s. str.) and not only in South Africa. The assignment of *Cadiscus* to the Othonninae has therefore remained dubious or at least uncertain, and NORDENSTAM (1968 p. 31f.) remarked that “the closer affinities of this little-known genus should be further investigated”. Indeed, with its elongated stems rooting in the mud, erect flowering shoots with linear or lanceolate leaves, ecalyculate capitula borne singly on simple peduncles from the upper leaf-axils, a uniseriate involucre of 8 to 10 partly connate phyllaries, coarse, basally flattened pappus bristles of ray-florets, and sterile disc-floret styles, *C. aquaticus* is unique in Senecioneae and has therefore been hard to place.

Our ongoing molecular systematic studies in the Senecioneae recently shed new light on the phylogenetic affinities of *Cadiscus*, placing it nested within *Senecio* s.str. (sensu PELSER et al. 2007). This phylogenetic position is well supported in both nuclear and plastid trees (PELSER et al. in prep.), and we therefore advocate a transfer of the single species of *Cadiscus* to *Senecio*.

***Senecio cadiscus* B. NORD. & PELSER, nom. nov.**, pro *Cadiscus aquaticus* E.MEY. ex DC., Prodr. 7(1): 255 (1838), non *Senecio aquaticus* HILL nec *S. aquaticus* LOISEL. nec *S. aquaticus* BOISS. - Lectotype (designated here): South Africa, [Western Cape], Zwartland in Dimpfel R. l., DRÈGE 1734, “*Cadiscus aquaticus* E.M.” (G-DC sheet 1).

Original material collected by DRÈGE is present in other herbaria, viz. DRÈGE s.n. , “*Cadiscus aquaticus* E.M. a” (G-DC, K, NY, S, SAM); “*Cadiscus aquaticus* E.M. b” (S). – DE CANDOLLE (1838) cites the locality as “ad Zwartland, in Dimpfel”, whereas DRÈGE (1843) has two more generalized localities, viz., “Am Dassenberg, (zwischen Paardeberg und Groenekloof), unter 500 Fuss. September” (litt. a on his herbarium labels; DRÈGE 1843, p. 102), and “Zwischen Groenekloof und Saldanhaabaai, unter 500 Fuss. September, October” (litt. b; DRÈGE 1843, p. 113).

The lectotype chosen here is the only specimen with locality statement agreeing exactly with the protologue.

Some of the morphological peculiarities of the species are no doubt explained by the unusual habitat. The development of narrow leaves, some of which may be floating, and white flowers, is reminiscent of other water plants such as subgenus *Batrachium* of *Ranunculus* (Ranunculaceae). The coarse and awn-like pappus bristles may be an adaptation to zoochory, perhaps dispersal by waterfowl. This may also be an explanation for the presence of myxogenic hair tufts on the cypsela base. Mucilaginous cypsela hairs, due to being soaked in water, occur in different taxa within the subtribe Senecioninae, particularly among those adapted to dry areas (e.g., *Bolandia*, *Dauresia*, *Euryops* spp., *Jacobaea*, *Mesogramma*, *Psednotrichia*), however the concentration of such hairs to the basal part of the fruit is an unusual or even unique feature. The flowering capitula of *S. cadiscus* are exposed to pollinators on erect peduncles above the water surface, but its fruiting heads seem to be borne more or less at the water surface level (Fig. 1). A possible dispersal scenario is that in the fruiting stage, when the phyllaries are broken up and shed, the fruits are exposed to dispersal agents. In this stage, the mucilage on the cypsela base might make the fruits adhere to the receptacle until the coarse pappus bristles stick to a disperser, such as a waterfowl, and the diaspore is carried away. Observations on dispersal agents and mechanisms should be made in order to confirm these speculations and empirically ascertain the role of the unusual pappus and myxogenic cypsela hairs.

*Senecio cadiscus* is locally endemic in the Western Cape Province, nowadays endangered and found only in some vernal pools or ponds between Malmesbury and Hopefield (GOLDBLATT 1978, BOND & GOLDBLATT 1984, GOLDBLATT & MANNING 2000). In 2007, ERNST VAN JAARVELD found the species to be still locally common in ponds at Philadelphia turnoff from Malmesbury road (Tierhoogte) and at Mamre Road near Darling.

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**Fig. 1.**

*Senecio cadiscus* B. NORD. & PELSER in its natural habitat, South Africa, Western Cape Province, Hopefield, August 1995. Photo J. MANNING.